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Seeley's Essentials of Anatomy & Physiology, 10e **(VanPutte)**
Chapter 2 The Chemical Basis of Life

1) Which of the following is/are responsible for most of the mass of an atom?
A) Neutron
B) Proton
C) Electron
D) Both neutron and proton
E) Both electron and neutron

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 2. Understand
Learning Outcome: 02.01B Define matter, mass, and weight.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

2) The mass number of an element is
A) the number of neutrons in the atom.
B) the number of protons in the atom.
C) the sum of the number of protons plus the number of neutrons.
D) the sum of the number of protons plus the number of electrons.
E) the sum of the number of neutrons plus the number of electrons.

Answer: C
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01D Define atomic number and mass number.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

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3) The chemical notation for magnesium ions is Mg^{+2}. The designation +2 indicates that
A) two electrons have been lost.
B) two protons have been gained.
C) the ion is negatively charged.
D) the atomic number is two.
E) the number of electrons equals the number of protons.

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01E Name the subatomic particles of an atom, and indicate their location.
HAPS Learning Outcome: C01.1c With respect to the structure of an atom: Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles.

4) The smallest particle of an element that has the chemical characteristics of that element is a(n) _____.
A) neutron
B) proton
C) electron
D) atom
E) electron cloud

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01C Distinguish between an element and an atom.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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5) Subatomic particles located in the nucleus of an atom are called _____.
A) protons
B) neutrons
C) electrons
D) orbitals
E) Both "protons" and "neutrons" are correct.

Answer: E
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01E Name the subatomic particles of an atom, and indicate their location.
HAPS Learning Outcome: C01.1a With respect to the structure of an atom: Describe the charge, mass, and relative location of electrons, protons and neutrons.

6) Subatomic particles that possess a negative charge, and move around the nucleus of an atom, are called _____.
A) protons
B) electrons
C) neutrons
D) photons
E) quarks

Answer: B
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01E Name the subatomic particles of an atom, and indicate their location.
HAPS Learning Outcome: C01.1a With respect to the structure of an atom: Describe the charge, mass, and relative location of electrons, protons and neutrons.

7) The atomic number of an atom is equal to
A) the number of neutrons in the atom.
B) the number of protons in the atom.
C) the sum of the number of protons plus the number of neutrons.
D) the sum of the number of protons plus the number of electrons.
E) the sum of the number of neutrons plus the number of electrons.

Answer: B
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01D Define atomic number and mass number.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

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8) The amount of matter in an object is its _____.
A) mass
B) weight
C) atomic number
D) element
E) ionic charge

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01B Define matter, mass, and weight.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

9) The chemical behavior of an atom is largely determined by
A) the number of neutrons it has.
B) the size of its nucleus.
C) the electrons closest to the nucleus.
D) the size of neutrons it has.
E) its outermost electrons.

Answer: E
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 2. Understand
Learning Outcome: 02.01E Name the subatomic particles of an atom, and indicate their location.
HAPS Learning Outcome: C01.1b With respect to the structure of an atom: Relate the number of electrons in an electron shell to an atoms chemical stability and its ability to form chemical bonds.

10) Every atom of the element carbon has the same number of
A) protons.
B) neutrons.
C) electrons.
D) photons.
E) quarks.

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 2. Understand
Learning Outcome: 02.01C Distinguish between an element and an atom.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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11) Atoms that have gained or lost electrons are called
A) ions.
B) covalents.
C) nonpolars.
D) molecules.
E) neutrons.

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C01.1c With respect to the structure of an atom: Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles.

12) After a neutral atom accepts an additional electron, it becomes
A) positively charged.
B) negatively charged.
C) an ion.
D) a molecule.
E) Both "negatively charged" and "an ion" are correct.

Answer: E
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C01.1c With respect to the structure of an atom: Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles.

13) Two atoms with the same number of protons and electrons, but different numbers of neutrons, are called _____.
A) isotopes
B) ions
C) electrolytes
D) compounds
E) Both "ions" and "electrolytes" are correct.

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules; Chemistry
Bloom's: 1. Remember
Learning Outcome: 02.01C Distinguish between an element and an atom.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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14) The chemical symbol Ca^{2+} indicates that a calcium atom has
A) two protons in its nucleus.
B) lost two neutrons.
C) gained two protons.
D) lost two electrons.
E) an atomic number greater than 2.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C01.1c With respect to the structure of an atom: Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles.

15) If an iron atom (Fe) lost three electrons, what would be the charge of the resulting ion?
A) Fe^{-3}
B) Fe^{+6}
C) Fe^{+1}
D) Fe^{+2}
E) Fe^{+3}

Answer: E
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C01.1c With respect to the structure of an atom: Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles.

16) Atom X has an atomic number of 20 and has a mass number of 40. The number of protons in Atom X is equal to
A) 10.
B) 20.
C) 30.
D) 40.
E) 60.

Answer: B
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 4. Analyze
Learning Outcome: 02.01D Define atomic number and mass number.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

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17) Atom Y has 11 protons, 11 electrons, and 12 neutrons. What is the atomic number of Atom Y?
A) 11
B) 12
C) 22
D) 23
E) 24

Answer: A
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01D Define atomic number and mass number.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

18) Atom Y has 11 protons, 11 electrons, and 12 neutrons. What is the mass number of Atom Y?
A) 11
B) 12
C) 22
D) 23
E) 24

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 3. Apply
Learning Outcome: 02.01D Define atomic number and mass number.
HAPS Learning Outcome: C01.1d With respect to the structure of an atom: Distinguish among the terms atomic number, mass number and atomic weight.

19) _____ energy is a form of potential energy resulting from positions and interactions among subatomic particles.
A) Chemical
B) Mechanical
C) Radiant
D) Electric
E) Heat

Answer: A
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

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20) Energy
A) is the capacity to do work.
B) can neither be created nor destroyed.
C) is constantly being converted into different forms by the body.
D) can be stored in the chemical bonds between molecules/subatomic particles.
E) All of the choices are correct.

Answer: E
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

21) Which of the following analogies does NOT accurately illustrate the energy type it is paired with?
A) The cocking back of the trigger on a starters pistol before a race—Potential energy
B) Picking up speed while rolling down a snow-covered hill in winter—Kinetic energy
C) The stretching of a bungee chord without releasing it—Mechanical energy
D) The spring up you get when you jump on a pogo stick—Kinetic energy
E) Basketball players bending their knees before they do a layup—Mechanical energy

Answer: C
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 4. Analyze
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

22) If the products of a chemical reaction contain less potential energy than the reactants,
A) energy has been stored in the molecular bonds of the product.
B) energy has been released by the breaking of molecular bonds.
C) the reaction will be reversible without additional energy input.
D) a synthesis reaction is likely to have occurred.
E) All of the choices are correct.

Answer: B
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 3. Apply
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

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23) The conversion of ATP into ADP
A) adds a phosphate group.
B) stores energy in the release of an inorganic phosphate group.
C) is an example of an exchange reaction.
D) is reversible.
E) requires the input of energy.

Answer: D
Section: 02.02: Chemical Reactions
Topic: Energy transfer using ATP
Bloom's: 2. Understand
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
HAPS Learning Outcome: C05.1 Describe the generalized reversible reaction for release of energy from ATP and explain the role of ATP in the cell.

24) According to the law of conservation of energy, the total energy of the universe is
A) constant.
B) increasing exponentially.
C) decreasing exponentially.
D) increasing linearly.
E) decreasing linearly.

Answer: A
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

25) The conversion between different states of energy (e.g., potential energy to kinetic energy)
A) is not 100% efficient.
B) is 100% efficient.
C) typically generates heat.
D) is not possible, because energy can not change its state.
E) Both "is 100% efficient" and "typically generates heat" are correct.

Answer: E
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.

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26) When there is an equal sharing of electrons between atoms, the bond that is formed is called
A) an ionic bond.
B) a polar covalent bond.
C) a nonpolar covalent bond.
D) a hydrogen bond.
E) None of the choices are correct.

Answer: C
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

27) Nonpolar molecules
A) are created when the bonding atoms share electrons equally between themselves.
B) have an asymmetrical electrical charge.
C) are also considered ions.
D) result from polar covalent bonds.
E) All of the choices are correct.

Answer: A
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

28) Which of the following statements is FALSE about molecules?
A) In order to be considered a molecule, a structure must be an independent unit.
B) All compounds are automatically considered molecules.
C) Molecules are formed when two or more atoms chemically combine to form a structure that behaves as an independent unit.
D) The atoms that make up a molecule can either be the same or different.
E) The atoms that make up a molecule must be chemically bound to one another.

Answer: B
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 4. Analyze
Learning Outcome: 02.01H Differentiate between a molecule and a compound.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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29) Which of the following is considered a compound but not a molecule?
A) Water (H_20)
B) Sodium chloride (NaCl)
C) Calcium (Ca^{2+})
D) Glucose ($C_6H_{12}O_6$)
E) All of the choices are correct.

Answer: B
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 4. Analyze
Learning Outcome: 02.01H Differentiate between a molecule and a compound.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

30) Which of the following is NOT considered a compound?
A) Water (H_20)
B) Sodium chloride (NaCl)
C) Hydrogen chloride (HCl)
D) A hydrogen molecule (H_2)
E) All of the choices are correct.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 4. Analyze
Learning Outcome: 02.01H Differentiate between a molecule and a compound.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

31) When one atom loses an electron and another atom accepts that electron a(n) _____ bond between the two atoms results.
A) covalent
B) hydrogen
C) ionic
D) explosive
E) radioactive

Answer: C
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

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32) Covalent bonds occur when
A) one atom loses an electron.
B) two substances dissociate in water.
C) two atoms share electrons.
D) ions are formed.
E) one atom gains an electron.

Answer: C
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

33) The unequal, asymmetric sharing of electrons that results in one end (pole) of the molecule having a small electrical charge opposite the other end is called _____ bonding.
A) hydrogen
B) polar covalent
C) double covalent
D) ionic
E) nonpolar covalent

Answer: B
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

34) If a molecule consists of two or more different kinds of atoms, it is a(n) _____.
A) atom
B) ion
C) isotope
D) compound
E) Both "atom" and "ion" are correct.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01H Differentiate between a molecule and a compound.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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35) Ionic compounds
A) are held together by the force of attraction between oppositely charged ions.
B) are not considered to be molecules.
C) do not have distinct units.
D) All of the choices are correct.
E) None of the choices are correct.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

36) When the hydrogen bonds that maintain a protein's three-dimensional shape are broken, the protein becomes nonfunctional, and is said to be _____.
A) essential
B) denatured
C) structural
D) unsaturated
E) saturated

Answer: B
Section: 02.01: Basic Chemistry
Topic: Chemical bonding; Organic compounds
Bloom's: 2. Understand
Learning Outcome: 02.01G Explain what creates a hydrogen bond and relate its importance.; 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C02.1c With respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds: Provide biologically significant examples of each.; C04.5 Describe the four levels of protein structure and discuss the importance of protein shape for protein function.

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37) The chemical compound that is represented by the acronym DNA
A) contains the sugar deoxyribose.
B) has two chains that form a double helix.
C) is composed of nucleotides.
D) is responsible for controlling cell activities.
E) All the choices are correct.

Answer: E
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 2. Understand
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.; C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.

38) Given that sodium bicarbonate dissociates to form Na^+ and HCO_3^- when mixed with water, which of these would be part of the explanation for taking bicarbonate ($NaHCO_3$) for excess stomach acid?
A) $NaHCO^3$ will not release hydrogen ions when mixed with water.
B) HCO^{3-} will be a hydrogen ion acceptor.
C) Free hydrogen ions increase the acidity of a solution.
D) When bicarbonate ions combine with hydrogen ions, the pH increases.
E) All of the choices are correct.

Answer: E
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 4. Analyze
Learning Outcome: 02.03B Explain the importance of buffers in organisms.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

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39) A(n) _____ is formed when one atom loses an electron and another atom accepts that electron.
A) ion
B) ionic bond
C) hydrogen bond
D) covalent bond
E) atom

Answer: B
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

40) A(n) _____ is formed when two atoms share electrons.
A) ion
B) ionic bond
C) hydrogen bond
D) covalent bond
E) atom

Answer: D
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01F Compare and contrast ionic and covalent bonds.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

41) Substances that donate hydrogen ions (protons) to a solution are called _____.
A) acids
B) bases
C) alkaline
D) salts

Answer: A
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 1. Remember
Learning Outcome: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

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42) A solution with a pH of 7 is considered to be _____.
A) acidic
B) basic or alkaline
C) neutral
D) in equilibrium

Answer: C
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 1. Remember
Learning Outcome: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.

43) Chemicals that resist changes in pH when acids or bases are added to a solution are _____.
A) acids
B) bases
C) salts
D) buffers

Answer: D
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 1. Remember
Learning Outcome: 02.03B Explain the importance of buffers in organisms.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

44) A solution with a greater concentration of hydroxide ions than hydrogen ions is _____.
A) a buffer
B) a salt
C) basic
D) acidic
E) hydrophobic

Answer: C
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 2. Understand
Learning Outcome: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
HAPS Learning Outcome: C03.5 State acidic, neutral, and alkaline pH values.

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45) Given that $MgCl_2$ is composed of Mg^{+2} ions and Cl^- ions, $MgCl_2$ would be considered to be a(n) _____.
A) acid
B) base
C) salt
D) buffer

Answer: C
Section: 02.04: Inorganic Molecules
Topic: Inorganic compounds and solutions
Bloom's: 3. Apply
Learning Outcome: 02.04A Distinguish between inorganic and organic molecules.
HAPS Learning Outcome: C03.3 Define the term salt and give examples of physiological significance.

46) A(n) _____ is formed by the reaction of an acid and a base.
A) acid
B) base
C) salt
D) buffer

Answer: C
Section: 02.03: Acids and Bases
Topic: Inorganic compounds and solutions
Bloom's: 1. Remember
Learning Outcome: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
HAPS Learning Outcome: C03.3 Define the term salt and give examples of physiological significance.

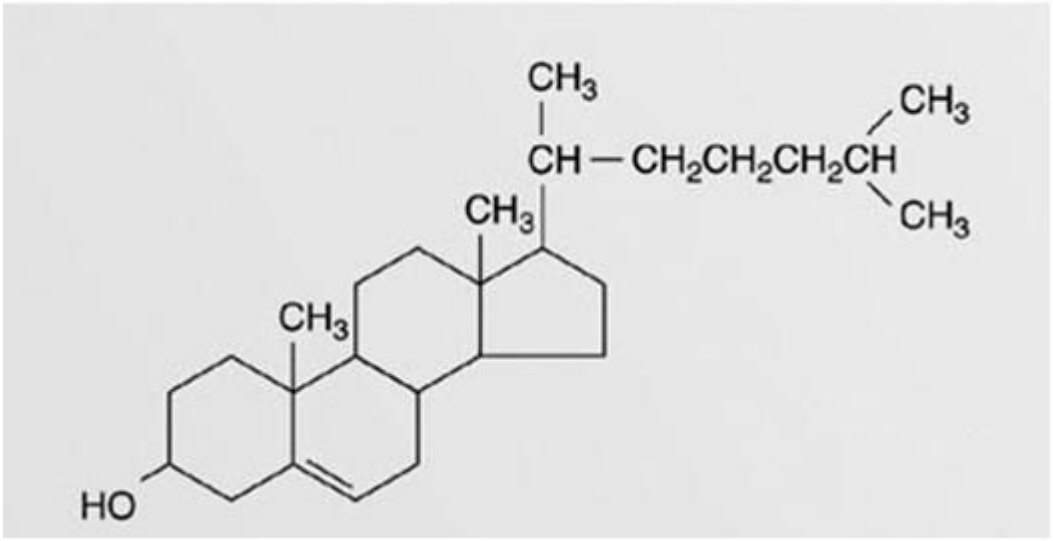
47) A solution with a pH of 4 would have _____ hydrogen ions than a solution with a pH of 6.
A) 2 times more
B) 2 times fewer
C) 20 times more
D) 20 times fewer
E) 100 times more

Answer: E
Section: 02.03: Acids and Bases
Topic: Inorganic compounds
Bloom's: 3. Apply
Learning Outcome: 02.03A Describe the pH scale and its relationship to acidic and basic solutions.
HAPS Learning Outcome: C03.4 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

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48) This figure represents an example of a(n) _____.



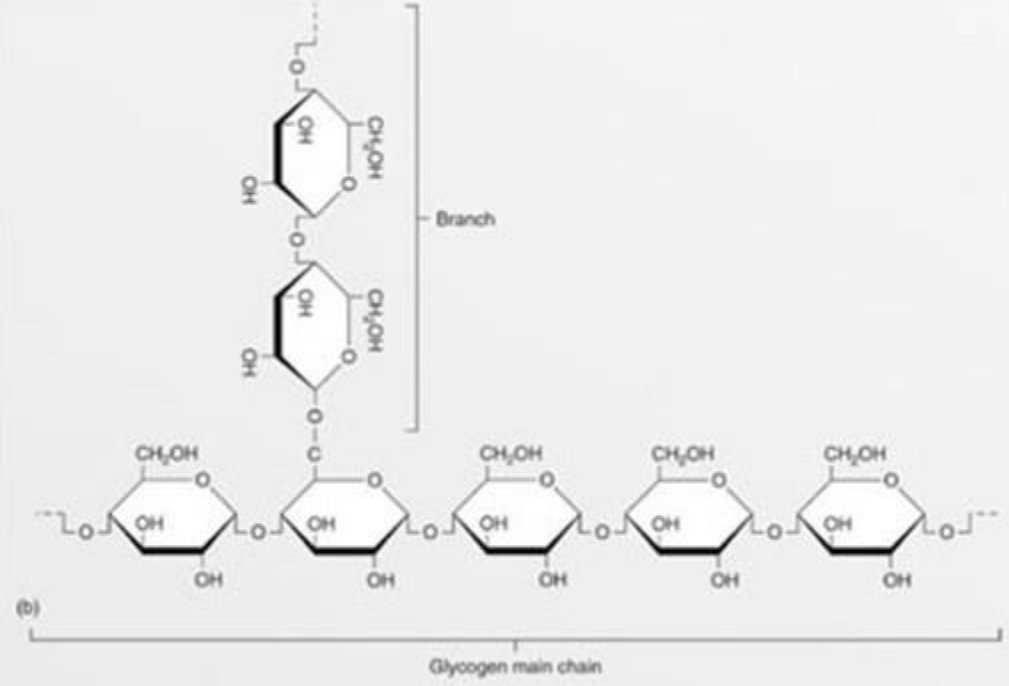
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A) steroid
B) triglyceride
C) phospholipids
D) wax
E) fatty acid

Answer: A
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 5. Evaluate
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.; C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.

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49) This figure represents an example of a(n) _____.



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A) protein
B) nucleic acid
C) lipid
D) carbohydrate
E) ATP molecule

Answer: D
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 5. Evaluate
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.; C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.

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50) Monosaccharides are the building blocks for _____.
A) carbohydrates
B) fats (triglycerides)
C) nucleic acids
D) proteins

Answer: A
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

51) Glycerol and fatty acids are the building blocks for _____.
A) carbohydrates
B) fats (triglycerides)
C) nucleic acids
D) proteins

Answer: B
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

52) Nucleotides are the building blocks for _____.
A) carbohydrates
B) fats (triglycerides)
C) nucleic acids
D) proteins

Answer: C
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

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53) The macromolecules that function as the genetic material and are involved in protein synthesis are _____.
A) carbohydrates
B) lipids
C) proteins
D) nucleic acids

Answer: D
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

54) Which group of major organic molecules is a common fuel nutrient and includes glycogen as a storage molecule?
A) Carbohydrates
B) Lipids
C) Proteins
D) Nucleic acids

Answer: A
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

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55) A large organic molecule was analyzed and found to contain carbon, hydrogen, oxygen, nitrogen, and sulfur. Of the following choices, which would most likely have been the type of molecule analyzed?
A) Carbohydrate
B) Lipid
C) Protein
D) Nucleic acid
E) Steroid

Answer: C
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 3. Apply
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.

56) The building blocks for proteins are _____.
A) monosaccharides
B) disaccharides
C) glycerol and fatty acids
D) nucleotides
E) amino acids

Answer: E
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.

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57) Which of these statements is TRUE?
A) Carbohydrates are organic molecules formed from amino acid building blocks.
B) Monosaccharides become bound together by hydrolysis reactions to form polysaccharides.
C) Monosaccharides, disaccharides, and polysaccharides are large inorganic molecules.
D) The building blocks for lipids are nucleotides.
E) Nucleic acids are composed of monomers called nucleotides.

Answer: E
Topic: Organic compounds
Bloom's: 2. Understand
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.; C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.

58) The chemical compound that is represented by the acronym ATP
A) is synthesized using energy released during the breakdown of food molecules.
B) can be broken down to ADP and a fatty acid.
C) has nothing to do with stored energy.
D) is a common temporary storage form of immediately usable energy within cells.
E) Both "is synthesized using energy released during the breakdown of food molecules" and "is a common temporary storage form of immediately usable energy within cells" are correct.

Answer: E
Section: 02.02: Chemical Reactions
Topic: Energy transfer using ATP
Bloom's: 2. Understand
Learning Outcome: 02.02C Distinguish between chemical reactions that release energy and those that take in energy.
HAPS Learning Outcome: C05.1 Describe the generalized reversible reaction for release of energy from ATP and explain the role of ATP in the cell.

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59) Sucrose is an example of a(n) _____.
A) monosaccharide
B) lipid
C) disaccharide
D) inorganic molecule
E) polysaccharide

Answer: C
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.

60) Glycogen and starch are examples of _____.
A) monosaccharides
B) nucleic acids
C) proteins
D) polysaccharides
E) lipids

Answer: D
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.

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61) Which of these statements concerning lipids is NOT true?
A) The building blocks of fats (triglycerides) are fatty acids and glycerol.
B) A fatty acid that contains only single covalent bonds between the carbon atoms is called unsaturated.
C) Fats, phospholipids, and steroids are lipids.
D) Lipids are substances that dissolve in nonpolar solvents.

Answer: B
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 4. Analyze
Learning Outcome: 02.05A Describe the structural organization and major functions of carbohydrates, lipids, proteins, and nucleic acids.
HAPS Learning Outcome: C04.4a With respect to carbohydrates, proteins, lipids and nucleic acids: Identify the monomers and polymers.; C04.4b With respect to carbohydrates, proteins, lipids and nucleic acids: Compare and contrast general molecular structure.; C04.4c With respect to carbohydrates, proteins, lipids and nucleic acids: Provide specific examples.

62) When two or more atoms, ions, or molecules combine to form a new and larger molecule, the process is called a _____ reaction.
A) decomposition
B) synthesis
C) reversible
D) buffer
E) equilibrium

Answer: B
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.02A Summarize the characteristics of synthesis, decomposition, and exchange reactions.
HAPS Learning Outcome: C04.3 Define and give examples of dehydration synthesis and hydrolysis reactions.

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63) Which of the following processes is (are) a synthesis reaction?
A) Glycolysis
B) The creation of a protein from amino acids
C) Glycogenolysis
D) All of the choices are correct.

Answer: B
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 4. Analyze
Learning Outcome: 02.02A Summarize the characteristics of synthesis, decomposition, and exchange reactions.
HAPS Learning Outcome: C04.3 Define and give examples of dehydration synthesis and hydrolysis reactions.

64) Chemical reactions that can proceed from reactants to products and from products to reactants are called _____ reactions.
A) exchange
B) synthesis
C) decomposition
D) reversible
E) net reaction

Answer: D
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.02B Explain how reversible reactions produce chemical equilibrium.

65) In a reversible reaction, when the rate of product formation is equal to the rate of reactant formation, the reaction is
A) stopped.
B) at equilibrium.
C) in danger of exploding.
D) a net decomposition reaction.
E) a net synthesis reaction.

Answer: B
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 2. Understand
Learning Outcome: 02.02B Explain how reversible reactions produce chemical equilibrium.

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66) A substance that increases the rate at which a reaction proceeds, without itself being changed or depleted, is a _____.
A) catalyst
B) reactant
C) buffer
D) base
E) product

Answer: A
Section: 02.02: Chemical Reactions; 02.05: Organic Molecules
Topic: Chemical bonding; Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.02D Describe the factors that can affect the rate of chemical reactions.; 02.05B Explain how enzymes work.
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

67) Enzymes
A) are globular proteins.
B) function as biological catalysts.
C) lower the activation energy of a reaction.
D) can be used to regulate chemical reactions.
E) All of the choices are correct.

Answer: E
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 1. Remember
Learning Outcome: 02.05B Explain how enzymes work.
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

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68) Which of the following will decrease the rate at which a reaction occurs?
A) Decreasing the concentration of reactants
B) Increasing the concentration of reactants
C) Increasing the temperature
D) Increasing the amount of the required catalyst
E) All of the choices are correct.

Answer: A
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 4. Analyze
Learning Outcome: 02.02D Describe the factors that can affect the rate of chemical reactions.
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

69) In living things, which of these is most important for regulating the rate of chemical reactions?
A) Changing the concentration of reactants
B) Changing temperature
C) Changing the concentration and activity of enzymes that catalyze the reactions
D) The nature of reacting substances; for example, carbohydrates react faster than lipids.

Answer: C
Section: 02.02: Chemical Reactions
Topic: Chemical bonding
Bloom's: 4. Analyze
Learning Outcome: 02.02D Describe the factors that can affect the rate of chemical reactions.
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

70) Enzymes function by
A) increasing the activation energy needed to start a chemical reaction.
B) having a specific shape that allows them to bind to particular reactants.
C) each enzyme acting as a catalyst for many different reaction types.
D) greatly decreasing reaction rates.
E) doing all of these.

Answer: B
Section: 02.05: Organic Molecules
Topic: Organic compounds
Bloom's: 2. Understand
Learning Outcome: 02.05B Explain how enzymes work.
HAPS Learning Outcome: C04.6 Demonstrate factors that affect enzyme activity, including denaturation, and interpret graphs showing the effects of various factors on the rate of enzyme-catalyzed reactions.

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71) Which of these is NOT a property of water that makes it useful for living organisms?
A) Water allows body temperature to increase or decrease rapidly.
B) Water causes ionic substances to dissociate.
C) Water acts as a lubricant.
D) Water is necessary for the transport of nutrients, gases, and waste products.
E) Water is necessary for many chemical reactions.

Answer: A
Section: 02.04: Inorganic Molecules
Topic: Inorganic compounds and solutions
Bloom's: 3. Apply
Learning Outcome: 02.04B 02.04B Describe how the properties of oxygen, carbon dioxide, and water contribute to their physiological functions.
HAPS Learning Outcome: C03.1 Discuss the physiologically important properties of water.

72) Which of these is an organic molecule?
A) H_2O
B) H_2CO_3
C) CO_2
D) NaCl
E) $CaCl_2$

Answer: B
Section: 02.04: Inorganic Molecules
Topic: Inorganic compounds and solutions; Organic compounds
Bloom's: 4. Analyze
Learning Outcome: 02.04A Distinguish between inorganic and organic molecules.
HAPS Learning Outcome: C04.1 Define the term organic molecule.

73) Which of the following pairs correctly match(es) the example with its classification?
A) Compound—two atoms of hydrogen combined
B) Molecule—sodium chloride
C) Molecule—two hydrogen atoms and one oxygen atom combined
D) Compound—two hydrogen atoms and one oxygen atom combined
E) Both "Molecule—two hydrogen atoms and one oxygen atom combined" and "Compound—two hydrogen atoms and one oxygen atom combined" are correct.

Answer: E
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 5. Evaluate
Learning Outcome: 02.01H Differentiate between a molecule and a compound.
HAPS Learning Outcome: C01.3 Compare and contrast the terms atoms, molecules, elements, and compounds.

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74) Chemistry is the scientific discipline that is concerned with cellular composition and the structure of their substances and the reactions they undergo.

Answer: FALSE
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01A Define chemistry and state its relevance to anatomy and physiology.

75) Which of the following statements about ionic compounds is TRUE?
A) Ionic compounds dissociate in water because negative ions are attracted to the negative ends of water molecules and positive ions are attracted to the positive ends of water molecules.
B) Ionic compounds dissociate in water because positive ions are attracted to the negative ends of water molecules and negative ions are attracted to the positive ends of water molecules.

Answer: B
Section: 02.01: Basic Chemistry
Topic: Inorganic compounds and solutions
Bloom's: 2. Understand
Learning Outcome: 02.01I Describe the process of dissociation.
HAPS Learning Outcome: C03.2 Distinguish among the terms solution, solute, solvent, colloid suspension, and emulsion.

76) Understanding chemistry is important for the study of anatomy and physiology because
A) the body is composed of chemicals.
B) the interactions of the different chemicals of the body are responsible for body function.
C) many diseases and disorders can be explained at the chemical level.
D) All of the choices are correct.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Atoms and molecules
Bloom's: 1. Remember
Learning Outcome: 02.01A Define chemistry and state its relevance to anatomy and physiology.

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77) The weak attraction between the negative end of one polar molecule and the positive end of another polar molecule is called a(n) _____bond.
A) polar covalent
B) ionic
C) nonpolar covalent
D) hydrogen

Answer: D
Section: 02.01: Basic Chemistry
Topic: Chemical bonding
Bloom's: 1. Remember
Learning Outcome: 02.01G Explain what creates a hydrogen bond and relate its importance.
HAPS Learning Outcome: C02.1b With respect to non polar covalent, polar covalent, ionic, and hydrogen bonds: Explain the mechanism of each type of bond.

78) When ionic compounds dissolve in water, they
A) dissociate, meaning they separate from each other.
B) interact with water molecules.
C) separate to form electrolytes.
D) All of the choices are correct.

Answer: D
Section: 02.01: Basic Chemistry
Topic: Inorganic compounds and solutions
Bloom's: 2. Understand
Learning Outcome: 02.01I Describe the process of dissociation.
HAPS Learning Outcome: C03.2 Distinguish among the terms solution, solute, solvent, colloid suspension, and emulsion.

79) Oxygen is essential for most living organisms because
A) it acts as a buffer, regulating pH.
B) it stabilizes body temperature.
C) it is an important enzyme.
D) it is an important reactant in a complex series of chemical reactions in which energy is extracted from food molecules.

Answer: D
Section: 02.04: Inorganic Molecules
Topic: Inorganic compounds and solutions
Bloom's: 2. Understand
Learning Outcome: 02.04B 02.04B Describe how the properties of oxygen, carbon dioxide, and water contribute to their physiological functions.

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